CLAIMS

WE CLAIM:

1. A composition, comprising

a therapeutically effective amount of a composition of matter selected from the group consisting of epoxyeicosatrienoic acids (EETs), epoxyeicosatrienoic acid metabolic products, epoxyeicosatrienoic acid and dihydroxyeicosatrienoic acid analogs, and combinations thereof, in a pharmaceutically acceptable excipient;

wherein the therapeutically effective amount of the composition of matter reduces inflammation or an immunological disorder in a recipient or prevents cell death from hypoxia reoxygenation in a cell.

2. The composition of claim 1, wherein the epoxyeicosatrienoic acids are selected from the group consisting of [5,6]-EET, [8,9]-EET, [11,12]-EET, and combinations thereof.

3. The composition of claim 1, wherein the epoxyeicosatrienoic acid metabolic products are selected from the group consisting of the dihydroxyeicosatrienoic acids (DHETs) [5,6]-DHET, [8,9]-DHET, [11,12]-DHET, [14,15]-DHET, and combinations thereof.

4. The composition of claim 1, wherein the epoxyeicosatrienoic acid and dihydroxyeicosatrienoic acid analogs are selected from the group consisting of episulfide derivatives, sulfonamide derivatives, epoxyeicosadienoic acids, epoxyeicosamonoenoic acids, epoxyeicosanoic acids, analogs in which the olefins are replaced with acetylene groups, analogs in which the olefins are replaced with cyclopropane groups, analogs in which the epoxide moiety is replaced with an oxitane rings, analogs in which the epoxide moiety is replaced with a furan rings, and heteroatom analogs.

5. The composition of claim 5, wherein the epoxyeicosatrienoic acid and dihydroxyeicosatrienoic acid analogs are selected from the group consisting of RKB and KMR.

6. The composition of claim 1, further comprising an epoxide hydrolase inhibitor.

7. The composition of claim 6, wherein the epoxide hydrolase inhibitor is an amide, carbamate, or urea.

8. The composition of claim 1, further comprising an anti-inflammatory agent or an anti-oxidant agent.

9. The composition of claim 8, wherein the anti-inflammatory agent is selected from the group consisting of anti-inflammatory peptides, steroids, and non-steroid anti-inflammatory agents.

10. A method for treating inflammation or an immunological disorder, comprising:
administering to a subject a therapeutically effective amount of a composition of matter selected from the group consisting of epoxyeicosatrienoic acids (EETs), epoxyeicosatrienoic acid metabolic products, epoxyeicosatrienoic acid and dihydroxyeicosatrienoic acid analogs, and combinations thereof,
wherein the therapeutically effective amount of the composition of matter reduces inflammation or the immunological disorder in the subject.

11. The method of claim 10, wherein the inflammation is caused by cardiovascular disease.

12. The method of claim 10, wherein the inflammation is caused by a rheumatologic disorder.

13. The method of claim 10, wherein the inflammation is caused by atherosclerosis.

14. The method of claim 10, wherein the inflammation is caused by an autoimmune disorder.

15. The method of claim 10, wherein the wherein the administration comprises producing EETs from a cytochrome P450 epoxygenase.

16. The method of claim 15, wherein the cytochrome P450 epoxygenase is selected from the group consisting of the CYP1A, CYP2B, CYP2C, CYP2E, and CYP2J enzymes.

17. The method of claim 16, wherein the CYP2J enzyme is a mammalian homologue of CYP2J2.

18. The method of claim 16, wherein the homologue is human CYP2J2.

19. The method of claim 16, wherein the homologue is rat CYP2J3 or mouse CYP2J5.

20. The method of claim 10, wherein cytochrome P450 epoxygenase is produced from a recombinant cytochrome P450 epoxygenase polynucleotide.

21. The method of claim 10, further comprising:

administering an epoxide hydrolase inhibitor to the subject.

22. The method of claim 10,wherein the composition of matter is produced from a cytochrome P450 epoxygenase protein that has been provided to the subject.

23. The method of claim 22,wherein the cytochrome P450 epoxygenase is expressed from a recombinant cytochrome P450 epoxygenase coding polynucleotide that has been provided to the subject.

24. The method of claim 23, wherein the recombinant cytochrome P450 epoxygenase coding polynucleotide is expressed in endothelial cells of the subject.

25. A method for preventing inflammation or an immunological disorder, comprising:

administering to a subject a prophylactically effective amount of a composition of matter selected from the group consisting of epoxyeicosatrienoic acids (EETs), epoxyeicosatrienoic acid metabolic products, epoxyeicosatrienoic acid and dihydroxyeicosatrienoic acid analogs, and combinations thereof,

wherein the prophylactically effective amount of the composition of matter prevents inflammation or the immunological disorder in the subject.

26. A method for inhibiting expression of cell adhesion molecule in an endothelial cell, comprising:

contacting an endothelial cell with an effective amount of a composition of matter selected from the group consisting of epoxyeicosatrienoic acids (EETs), epoxyeicosatrienoic acid metabolic products, epoxyeicosatrienoic acid and dihydroxyeicosatrienoic acid analogs, and combinations thereof, wherein the effective amount of the composition of matter is sufficient to inhibit expression of cell adhesion molecule VCAM-1 by the endothelial cell.

27. A method for modulating NF-κB activity in a cell, comprising:

contacting a cell with an effective amount of a composition of matter selected from the group consisting of epoxyeicosatrienoic acids (EETs), epoxyeicosatrienoic acid metabolic products, epoxyeicosatrienoic acid and dihydroxyeicosatrienoic acid analogs, and combinations thereof,

wherein the effective amount of the composition of matter is sufficient to inhibit IκB kinase (IKK) in the cell.

28. A method for preventing cell death from hypoxia-reoxygenation, comprising:
contacting a cell undergoing hypoxia reoxygenation with an effective amount of a composition of matter selected from the group consisting of epoxyeicosatrienoic acids (EETs), epoxyeicosatrienoic acid metabolic products, epoxyeicosatrienoic acid and dihydroxyeicosatrienoic acid analogs, and combinations thereof,
wherein the composition prevents cell death in the cell undergoing hypoxia-reoxygenation.

29. The method of claim 28,wherein the composition of matter is produced from a cytochrome P450 epoxygenase protein that has been provided to the cell.

30. The method of claim 29, wherein the cytochrome P450 epoxygenase is provided by expressing a recombinant cytochrome P450 epoxygenase coding polynucleotide in the cell.

31. A method of screening for an anti-inflammatory compound, comprising:
(a) administering to a cell a compound suspected of being an anti-inflammatory compound;
(b) assaying cytochrome P450 epoxygenase activity of the cell;
(c) comparing the cytochrome P450 epoxygenase activity of the cell with the cytochrome P450 epoxygenase activity of a cell to which the compound suspected of being an anti-inflammatory compound has not been administered, wherein an increased cytochrome P450 epoxygenase activity of the cell in step (a) as compared with the cytochrome P450 epoxygenase activity of the cell to which the compound suspected of being an anti-inflammatory compound has not been administered identifies the compound as an anti-inflammatory compound.

32. A method of screening for a compound that prevents cell death from hypoxia-reoxygenation, comprising:

(a) administering to a cell a compound suspected of being a compound that prevents cell death from hypoxia-reoxygenation;

(b) assaying cytochrome P450 epoxygenase activity of the cell;

(c) comparing the cytochrome P450 epoxygenase activity of the cell with the cytochrome P450 epoxygenase activity of a cell to which the compound suspected of being a compound that prevents cell death from hypoxia-reoxygenation has not been administered, wherein an increased cytochrome P450 epoxygenase activity of the cell in step (a) as compared with the cytochrome P450 epoxygenase activity of the cell to which the compound suspected of being a compound that prevents cell death from hypoxia-reoxygenation identifies the compound as a compound that prevents cell death from hypoxia-reoxygenation.

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